Summary Report from General Education Outcome Assessment in Area C: Natural Sciences Spring 2013

Submitted by the Area C Workgroup
December 2013

Table of Contents

I. General Education Outcomes in Area C: Natural Sciences

General Education Outcomes (GEOs) are measurable outcomes that directly correspond to each of the General Education areas. Students are expected to have acquired and be able to demonstrate these outcomes by the completion of the Associate Degree. City College of San Francisco has eight General Education areas:

- **Area A**: Communication & Analytical Thinking
- **Area B**: Written Composition
- **Area C**: Natural Sciences
- **Area D**: Social and Behavioral Sciences
- **Area E**: Humanities
- **Area F:** United States History & Government
- **Area G**: Health Knowledge & Physical Skills
- **Area H**: Ethnic Studies, Women's Studies & Lesbian, Gay, Bisexual, and Transgender Studies

Courses in Area C for Spring 2013 were:

Anatomy 14, 25 | Anthropology 1 | Astronomy 1, 4, 14, 16*, 17, 18, 19 | Biology 9, 11, 15, 20, 30, 31, 32, 40, 100B | Biotechnology 115, 120 | Botany 10 | Chemistry 32, 40, 101A, 103A, 110 | Ecology 20 | Energy 3 | Genetics 10, 15 | Geography 1, 49 | Geology 10, 11, 18, 20A, 20B, 20C, 25, 30 | Interdisciplinary Studies 9 | Microbiology 10, 12, 51* | Nutrition 12, 51*, 52 | Oceanography 1 | Ornamental Horticulture 76, 77 | Paleontology 1 | Physical Science 11 | Physics 2A, 4A, 10, 40, 41 | Physiology 1, 12, 67 | Zoology 10

A. Revision and Updating Outcomes

Table 1. General Education Outcomes in Area C: Natural Sciences from Spring 2009 and updated Fall 2013

Original GE Outcomes Area C (Spring 2009)	Revised GE Outcomes Area C (approved 10/16/2013)
Demonstrate an understanding of the scientific method.	1. Apply scientific inquiry and investigation of evidence to critically evaluate scientific arguments.
Communicate scientific ideas and theories effectively.	2. Communicate scientific ideas and theories effectively.
Apply models to explain the behavior of commonly occurring phenomena.	3. Apply scientific principles, theories, or models to explain the behavior of natural phenomena.
	4. Apply scientific knowledge and reasoning to human interaction with the natural world and issues impacting society.

Additional notes explaining workgroup processes, supporting reasoning, and responses to comments from the Academic Senate for each of the revised and approved GEO's is available in Appendices A and D.

B. Common Assessment Rubric

Table 2. Common Assessment Rubric for General Education Outcome "Apply models to explain the behavior of commonly occurring phenomena."

Level	Description
Proficiency	Students understand the model and can apply it to satisfactorily predict or explain behaviors or phenomena. (A passing ability.)
Developing	Students are developing an understanding of the model and the commonly occurring behaviors or phenomena it describes, but students cannot yet use the model to effectively make predictions or explain the behaviors or phenomena.
No Evidence	There is no evidence that students are aware of the model or the types of behaviors or phenomena that the model predicts or explains. (Includes students who didn't complete the assessment.)

The workgroup developed a holistic rubric (Table 2) to establish a common language to unite the many disciplines and faculty involved with instruction of Area C: Natural Science General Education courses. The workgroup discussed several options, but selected a three tier or three "bin" rubric to keep divisions between levels distinct. The workgroup also discussed terminology and selected level terms similar to those used by the ACCJC in an effort to maintain clarity and consistency. This rubric was sent to all Area C course coordinators along with examples of specific course and discipline assessments and how they could be converted to the holistic, common rubric (See Appendix B).

II. Analysis of Outcome Assessment Data

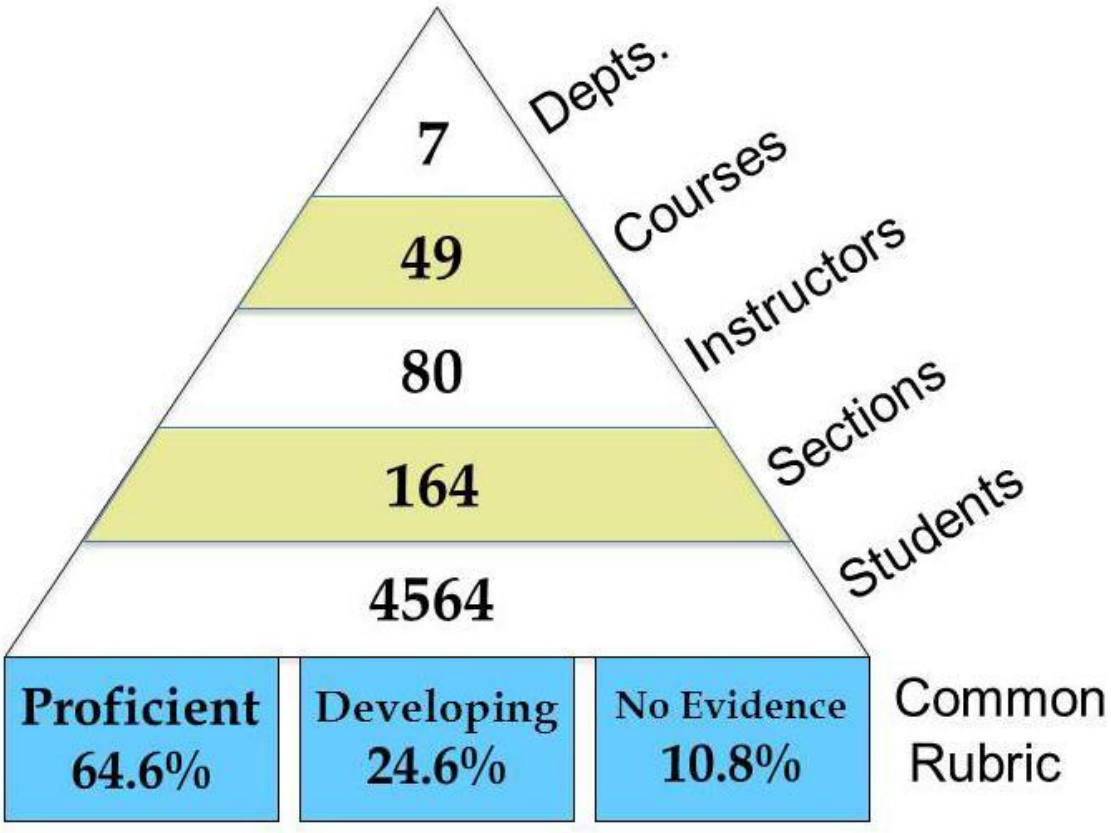


Figure 1. Area C General Education Assessment Results Spring 2013

Course Coordinators reported data through the College-wide SLO data entry process between May 2013 and August 31, 2013. In summary, 7 Departments, 49 Courses, 80 Instructors, 164 sections, and 4564 students were included in the assessment of the GEO "Apply models to explain the behavior of commonly occurring phenomena." (Figure 1). 64.6% of students were proficient, 24.6% of students were developing, and 10.8% of students showed no evidence. This assessment captured results from only one of three existing general education outcomes at the time. Therefore, the data may not reflect the overall proficiency, or lack thereof, for students in Area C Courses. To address this concern, we looked at the overall pass and withdrawal rates for Area C courses.

Table 3. Overall pass rates and withdrawal rates in Area C courses for Spring 2013.

	Pass % (A, B, C out of all those enrolled at census)	W %	SLO Proficiency % (from Spring 2013 Assessment)
All Area C Courses	60.80%	17.40%	64.6%
Mean	60.60%	21.90%	64.6%
Median	59.50%	17.20%	64.8%
High	95%	48.60%	96.6%
Low	15.40%	2%	31.6%

The pass rate in a GE Area C class in Spring 2013 is 61% (defined as the number of students who were enrolled on Census day and achieved an A, B, or C in the class). Individual course performance ranged from a low of 15.4% of students passing to a high of 95%. The withdrawal rate was 17.4% with a course high of 48.6% W and a low of 2% W (Table 3). Further

breakdown by section shows that the average section difference for Area C Courses was 29.3%. That means that the average difference between the highest passing section and the lowest passing section was 29 percentage points. (Minimum difference was 1.5%; the maximum was 51%. That means that for some courses, the pass rates among instructors are nearly identical, while for other courses, the differences in pass rates among instructors is so high there are at most 51 percentage points between them. For withdrawal rates, the range amongst instructors of the same course is on average 18.%, with a low of 4.4% and a high of 41.9%. Clearly there are differences in many areas between student performance and/or grading among instructors of the same course.

Based on these combined results of the Area C Assessment and overall pass rates for Spring 2013, many students are not achieving a proficient level after taking or completing an Area C course. To further investigate, the workgroup continued to collect data and explore perspectives of CCSF constituents to determine underlying causes and potential correlations leading to student success or preventing students from succeeding in these courses.

Pass and Withdrawal rates Campus Wide

Similar to the data summarized in Table 3, we also examined pass rates and withdrawal rates in other general education courses outside of Area C (data not shown). We were curious if these rates reflect issues specific to Area C or issues that may permeate the college. We randomly selected courses across various General Education disciplines and found that these types of data are not restricted to Area C courses; entry-level and advanced courses suffer from lack of student achievement. Much of these data were collected before rules preventing multiple repeats of courses were implemented. It may be that we will see these numbers change as students are faced with higher consequences of earning a W, D or F in a course.

English and Math Placement as markers of student success in Area C Courses

Table 4. College level English placement correlates with pass rate

		Pass	Not Pass	Withdrawal	Total
English Levels:	Collegiate	1980	478	474	2932
		67.5%	16.3%	16.2%	
	Upper	320	160	105	585
		54.7%	27.4%	17.9%	
	Lower	367	302	181	850
		43.2%	35.5%	21.3%	

"Collegiate" in Table 4 is defined as placement or enrollment in ENGL 1A. "Upper" , ENGL 96 and "Lower", ENGL L, 91, 92, or 93. Both the absolute number and percentage of students in each category is indicated in Table 4. Note: the levels refer to either a placement test OR an actual enrolled class -- the latter if they've taken classes, the former if not.

Figure 2. College level English placement correlates with pass rate in Area C Courses

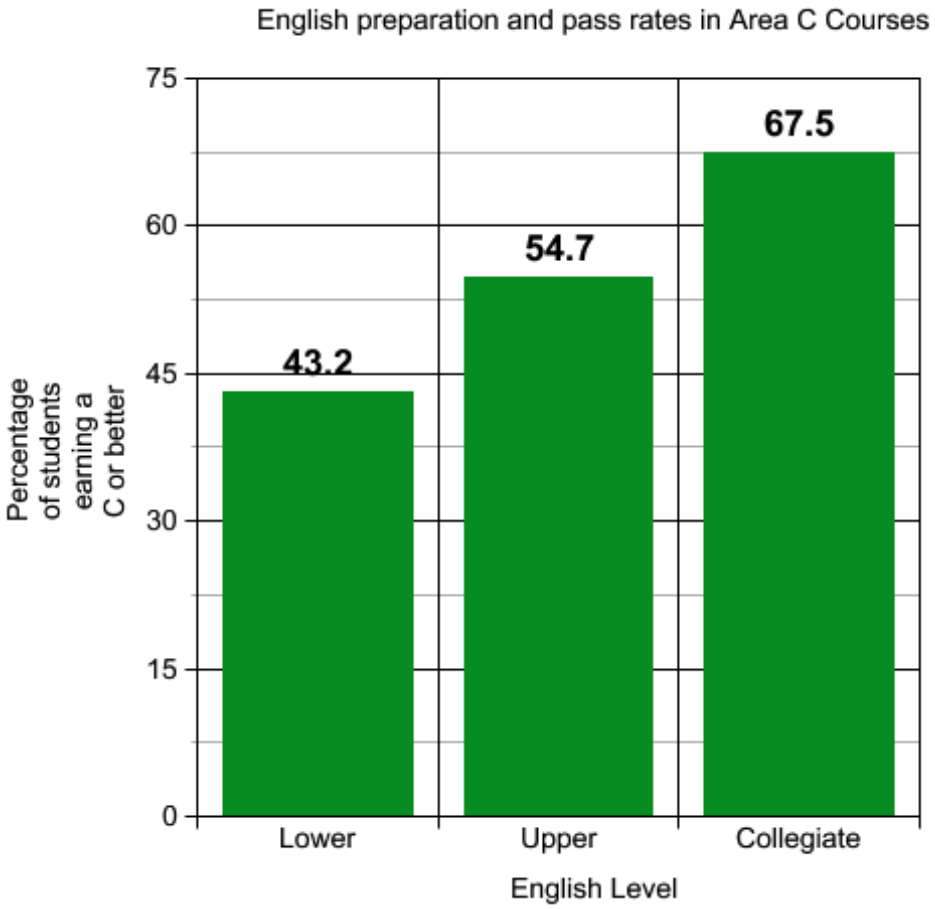
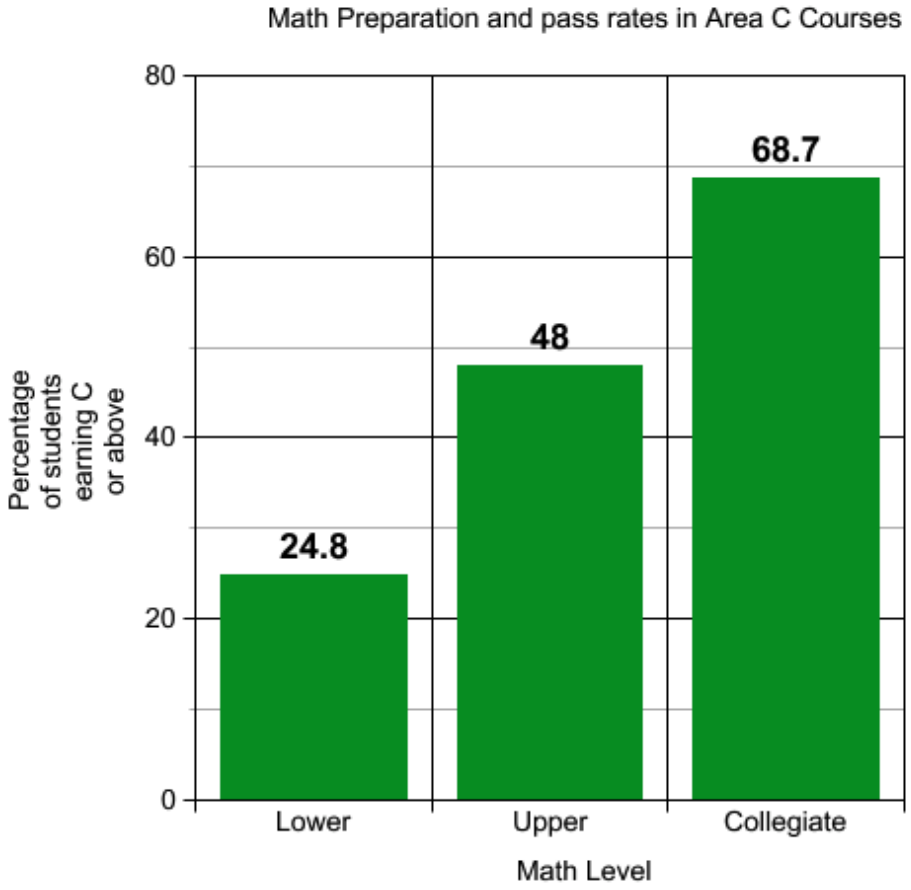


Table 5. Math placement and student success

"Collegiate" in Table 5 is defined as placement or enrollment in MATH 70, 75, 80, 90, 92, 95, 97 100A, 100B, 110A or higher . "Upper" , MATH 40 or 60 and "Lower", MATH E1 or E3. Both the absolute number and percentage of students in each category is indicated in Table 4. Note: the levels refer to either a placement test OR an actual enrolled class -- the latter if they've taken classes, the former if not.

Figure 3. College level Math placement correlates with pass rates in Area C Courses



Both collegiate level English and Math placement correlates with student pass rates in Area C courses. It is important to note that there are additional students not included in these data who did not complete the English or Math placement exams. These students may have already earned a college-level degree or are classified as "non-degree-seeking students" who are not required to take a placement exam. Whereas the majority of placed students enrolled in Area C courses place into collegiate level Math, about 30% of students don't. Lower Math placement shows a stronger correlation with lower pass rates and higher withdrawal rates.

These data point to a lack of effective communication between the school (faculty, counselors, etc.) and students in how important these placement tests are. It is difficult to determine what exactly is different about students that place into higher level Math. Although college level math may not be included in the curriculum of all Area C courses, perhaps the skills and thought processes that come with having proficiency in college level math are.

III. Results of College Wide Dialogue

A. Individual Faculty Comments on results of the Spring 2013 Area C General Education Assessment

The following exemplary comments were selected from informal discussion in the workgroup, amongst natural science colleagues, and from the Spring 2013 SLO data report.

- "The ability to take content and apply it using critical thinking skills continues to be a challenge each semester. Students also continue to be overcommitted both in terms of numbers of classes they are taking and/or work so the time devoted to study is not what is needed for proficiency truly to take place."
- "Students are missing basic life skills that would assist them such as study skills, but also things like familiarity with geography, basic math, and language."
- "We have a number of students struggling with math and language skills – especially those that should be taking ESL classes but aren't currently. Do we need high-school prerequisites on all these courses? Advisories don't seem to make a difference. Student preparation is poor."
- "Natural Science classes take a lot of outside homework time. We really do require, for example, 6 hours of homework a week for a 3-unit class. Students don't believe this. They think they can get away without having to do it, and then they over commit to work, school, and family, and they fail."
- "Percentage of drops/withdrawals from these classes are high."

These comments provided insight into some of the underlying reasons that students may struggle in Area C courses. To collect additional information, the workgroup sought feedback from the entire campus.

B. Feedback from campus wide dialogue:

On September 17, 2013 CCSF had a campus wide FLEX day. All faculty were required to attend and participate according to their respective contracts. As part of the campus-wide dialogue, faculty were shown the data from the Area C Assessment and asked, "How can you support students in the GE Area C: Natural Sciences courses?" These comments were collected through a survey distributed after the conclusion of the day. The faculty comments were coded into the following categories (these data are also included in the FLEX day report). The number in parentheses represents the number of instances that a comment of that category was provided.

- Students need to engage in stronger self assessment/learn basic study skills (28)
- College needs to restore student services/counseling/tutoring/etc. (25)
- Academic faculty could make stronger ties to science in other courses (25)
- Academic faculty could embed more critical thinking in non-science courses (15)
- Departments could collaborate and align math and language curriculum so they support one another (15)
- College should require ESL competency before admitted to science courses (12)
- Support better facilities and labs (10)
- Encourage science faculty to ground instruction in interactive/concrete/thematic examples (10)
- Promote learning communities/cohort groups in sciences (6)
- Make critical thinking class a prerequisite to science (4)
- Have students complete math course before science (4)
- Redesign curriculum so not dependent on outside time/respond to student lack of time (3)
- Assess learning styles/appeal to more learning styles (3)
- Incorporate more outside technologies to aid instruction (3)
- Science faculty should advertise success rate (lack of) and advertise rigor (3)
- Embolden early alert practices for struggling students (3)

These comments helped both support and expand on comments from individual faculty. The combined data from the GEO Assessment, Individual Faculty comments, and campus-wide faculty comments prompted us to look at additional data available through the Office of Research. In particular, as discussed in the previous sections, we investigated:

- Is the low level of proficiency unique to Area C Courses or is this a campus-wide phenomenon?
- What role does English and Math placement have in student success in Area C courses?

IV. Recommendations

How can the institution, departments, and individual faculty better serve students enrolled in Area C: Natural Sciences courses?

City College of San Francisco

- Share the results and information about these courses with all CCSF counselors and others providing academic advising especially the following ideas:
    - Balance the push for moving students quickly towards a degree with the need to bring student skills to collegiate levels. We do not want to increase barriers towards education; however, we should not push students to take classes for which they are not prepared.
    - Encourage counselors to use existing placement exams to advise course selection -- specifically students at lower and upper placement for math and English should be encouraged to focus first on completing their math and English levels prior to enrolling in science GE classes. (We are aware that this causes problems with students "finding" their major late, if it turns out science is what they want to pursue. See below for more ideas that can work around this.)
- Increase collaborations and foster learning communities between writing, math, and natural science courses so that students can have science content and thinking across multiple courses.
- Increase student support services like the STEM Center, Supplemental Instruction Groups, mentoring programs, and other services that could help our students (consult SFSU or other institutions for how they meet student needs).
- Increase professional development opportunities for faculty specifically geared to pedagogy for nonmajors.
- Provide additional assessment tools for students who advise themselves on course placement (and might be bypassing counseling and placement tests).
- Follow up on these recommendations and evaluate their success (or lack thereof) in future assessment cycles (especially as many of these issues are likely shared across other GE Areas).

Natural Sciences Departments

- Encourage Department Chairs to meet with academic-advising counselors annually (perhaps a roundtable or panel presentation) to explain course expectations and answer questions
- Create an easy reference resource for counselors to include prerequisites, advisories, and suggested skills for each class. (For example, some curriculum software, such as CurricuNET, will provide program descriptions that list all "hidden" prerequisites and advisories in an educational sequence.)
- Engage in more school meetings for shared discussion on these and other shared challenges and host school-wide workshops where we share best practices amongst similar courses and all faculty.
- Increase professional development on best practices college wide (especially sharing our own best practices with each other).
- Considered creating new curriculum that is team taught and interdisciplinary (and focused on helping, specifically, nonmajors) -- a 1-unit helper class (like a bootcamp) or a survey.
- Develop more cross-departmental study skills supplemental workshops/sessions for students (in collaboration with the Learning Assistance center.)

Course Level

- Offer course-specific study skills sessions – collaborate with all science departments at start of semester
- Share English/Math placement and achievement/grade data with students at start of class, so that they are more aware of the challenges they will face if they are at a lower placement level but choose to continue. (Empower the students to make course placement decisions that will best lead to their success.) e.g. "CCSF students who have placed into ENGL XX or MATH XX have had a success rate in this course of _____."
- Encourage additional coordination and discussion amongst instructors of the same course (different sections) to facilitate the sharing of best practices amongst each other, and ensure that faculty address consistent learning outcomes in each course.

V. Appendices

Appendix A. Justification for General Education Outcome Revision

Numbers below correlate to the revised GEO as described in Table 1.

1. The term scientific inquiry was selected to replace scientific method because of the broader implications of scientific inquiry and its applications in the classroom. The AAAS included this description in the Project 2061 literature: *"Scientific inquiry is more complex than popular conceptions would have it. It is, for instance, a more subtle and demanding process than the naive idea of "making a great many careful observations and then organizing them." It is far more flexible than the rigid sequence of steps commonly depicted in textbooks as "the scientific method." It is much more than just "doing experiments," and it is not confined to laboratories. More imagination and inventiveness are involved in scientific inquiry than many people realize, yet sooner or later strict logic and empirical evidence must have their day."*

Post 9/4 Academic Senate Meeting Note: We are also consciously leaving in "inquiry" to demonstrate a desire to stay on the forefront of science education (and with the understanding that it should not be difficult to map existing SLOs that use the term "scientific method" to this new language). Folks working at 4YCs, the state, and national level will also recognize this term and accept mapping with scientific method – they may even make changes towards using scientific inquiry themselves if they haven't done so already. Using the term "scientific inquiry" in a General Education Outcome does not affect course articulation or transfer. The course outline determines course articulation and transfer. And course outlines can maintain the word "scientific method" if they prefer. The mapping is still clear.

2. We considered removing this outcome to make room for the addition of one new one. However, a majority of survey respondents recommended keeping it, deeming the communication of science imperative.

3. The current outcome language (specifically the word model) was a source of confusion (to some). We hope that by including multiple terms, the comprehension and application of the outcome will increase.

Post 9/4 Academic Senate Meeting Note: We would like to elaborate further on why we used multiple versions of the term model in the proposed outcome. A recent publication in Scientific American entitled "Just a Theory: 7 Misused Science Words" writes about the misuse of the word model:

"However, theory isn't the only science phrase that causes trouble. Even Allain's preferred term to replace hypothesis, theory and law -- "model" -- has its troubles. The word not only refers to toy cars and runway walkers, but also means different things in different scientific fields. A climate model is very different from a mathematical model, for instance.
"Scientists in different fields use these terms differently from each other," John Hawks, an anthropologist at the University of Wisconsin-Madison, wrote in an email to LiveScience. "I don't think that 'model' improves matters. It has an appearance of solidity in physics right now mainly because of the Standard Model. By contrast, in genetics and evolution, 'models' are used very differently." (The Standard Model is the dominant theory governing particle physics.)"

4. This outcome, or something similar, was included at almost every other institution that we referenced (highly respected local and national two-year and four-year colleges with robust general education outcomes). The committee agreed that examining the relationship between humans and the natural world is a core component of natural sciences.

Post 9/4 Academic Senate Meeting Note: At the Academic Senate Meeting on 9/4, there was concern that the Astronomy courses in Area C would not be able to map their student learning outcomes to this new, proposed outcome #4. We researched learning outcomes in astronomy at other institutions and we examined the Student Learning Outcomes for each of the Area C: Natural Sciences courses that are in the Astronomy Department here at City College of San Francisco. We identified exemplary outcomes at other institutions that align or map to proposed outcome #4, and we identified preliminary mappings that work for the ASTR courses at City College of San Francisco (see Appendix B: Astronomy Outcome Mapping). We would also like to remind the members of the Academic Senate and the members of the college community directly involved with courses in the general education curriculum that refining and mapping outcomes is part of the continuous quality improvement process. The current course outlines of record would remain intact and articulated. As faculty bring revised and updated course outlines to the curriculum committee in the future, they will need to ensure that the outlines continue to map to any revised or updated general education outcomes.

Appendix B. Student Learning Outcome Mapping Examples

These discipline examples were developed by Area C instructors to provide guidance in development and implementation of assessment tools related to the General Education Outcome, "Apply models to explain the behavior of commonly occurring phenomena."

Biology

Level	Description	Criteria
Proficiency	Student can describe the process of diffusion and the requirement of large surface areas for moving small molecules through the body. They can provide some relevant examples (the alveoli, the placenta, capillaries, etc.)	Students score 6 out of 10 points on the SLO-specific class assignment.
Developing	Students may understand that diffusion is required for molecules to move through the body but cannot give examples or cannot articulate the role of large surface area in the process.	Students score between 2 and 6 out of 10 points on the SLO-specific class assignment.
No Evidence	Students cannot describe the role of surface area in diffusion, and cannot provide any examples.	Students score 1 or no points on the SLO-specific class assignment.

Chemistry

Level	Description	Criteria
Proficiency	Student can explain the macroscopic behavior of gases based on the Kinetic Molecular Theory and apply the Ideal Gas Equation to quantitatively describe the relationship between parameters such as pressure, temperature, and volume.	Students score 70% or higher on a SLO-specific quiz containing multiple questions focusing on this model.
Developing	Student recognizes that physical attributes of a gas can be related mathematically to one another but is unable to consistently apply the Ideal Gas Law or they cannot describe how molecular behavior causes physical properties.	Students score between 30-70% on a SLO-specific quiz containing multiple questions focusing on this model.
No Evidence	Student does not demonstrate an understanding of the conceptual or mathematical relationships between the different physical attributes of a gas.	Students score 30% or lower on a SLO-specific quiz containing multiple questions focusing on this model.

Oceanography

Level	Description	Criteria
Proficiency	Students can satisfactorily predict local climate patterns based on atmospheric and oceanic circulation models.	Students answer 4 of the 5 SLO-related questions correctly.
Developing	Students may be able to describe climate variations and/or atmospheric and oceanic circulation, but cannot relate the two processes.	Students answer 2 of the 5 SLO-related questions correctly.
No Evidence	Students cannot describe climate variations, oceanic circulation, nor the connections between these processes.	Students answer 1 or none of the SLO-related questions correctly (or fail to appear).

Engineering

Level	Description	Criteria
Proficiency	Students can predict health and environmental impacts of various energy harnessing mechanisms by applying a full life-cycle impact model that links cause and effect	Students score 70% or higher on the SLO-related assigned project.
Developing	Students may be able to describe health and environmental impacts of energy harnessing mechanisms but cannot predict them, nor articulate the cause and effect mechanism	Students score 50-69% or higher on the SLO-related assigned project.
No Evidence	Students cannot describe or recognize health and environmental impacts associated with energy harnessing.	Students score less than 50% on the SLO-related assigned project.

Appendix C. More Detailed Data Tables

These data tables include data on student grades for Spring 2013 only. We included these tables to highlight the various effects that Math and English placement have on success in different courses. These data may be useful for courses that are considering placing an advisory or prerequisite or for counselors who advise students on what courses they are prepared to take. When readers analyze or use these data, however, they should remember to include the many confounding variables present amongst classrooms. For example, some of these courses attract mostly majors or students who are pursuing careers in science -- others mostly attract nonmajors.

subject	crse	Math Skill Level	A	B	C	P	%Passing	D	F	NP	W	Grand Total
ANAT	25	Collegiate	66	55	43		69%	18	14		40	236
		Upper	8	11	21		42%	16	13		26	95
		Lower		1	1		15%	3	4		4	13
		NA	30	7	5	1	72%	2	6		9	60
ANTH	1	Collegiate	38	15	13	2	70%	5	12		12	97
		Upper	8	10	9	1	45%	8	18		8	62
		Lower	3			1	44%		4		1	9
		NA	10	5	2		57%	3	7		3	30
ASTR	1	Collegiate	35	32	28		61%	9	23		28	155
		Upper	11	18	29		38%	26	25		43	152
		Lower		3	7		25%	5	12		13	40
		NA	12	6	8		38%	5	11		26	68
	4	Collegiate	28	14	11		78%	7	5		3	68
		Upper	6	5	6		63%	3	3		4	27
		Lower					0%		1		1	2
		NA	3	3	1		88%		1			8
	14	Collegiate	2	10	7		42%	9	9		8	45
		Upper	2	1	6		30%	5	9		7	30
		Lower			2		17%	2	7		1	12
		NA	2	4	3		39%	2	5		7	23
	17	Collegiate	2	7	4		57%	1	8		1	23
		Upper		2	3		38%	2	1		5	13
		Lower					0%				1	1
		NA	2	1	1		57%		2		1	7
	18	Collegiate	2	1	1		44%	2			3	9
		Upper	1		1		67%		1			3
		Lower					0%				1	1
		NA	1	2	1		57%		2		1	7
	19	Collegiate	1	2	1		67%				2	6
		Upper	2				67%				1	3
		NA	1				33%				2	3
BIO	9	Collegiate	115	101	77		80%	21	26		24	364
		Upper	15	27	36		53%	19	29		22	148
		Lower	1	1	10		38%	6	6		8	32
		NA	7	11	5		68%		3		8	34
	11	Collegiate	27	21	32		66%	11	16		15	122
		Upper	3	8	10		57%	4	8		4	37
		Lower	1	1	1		25%	2	2		5	12
		NA	3	4	4		85%	1			1	13
	20	Collegiate	11	8	9		85%		5			33
		Upper		1	2		38%		5			8
		NA	1				100%					1
	31	Collegiate	5		3		62%	1	3		1	13
		Upper	3		2		50%		1		4	10
		Lower					0%		2		1	3
		NA	1	1	2		50%		2		2	8
	40	Collegiate	1	1	3		45%	1			5	11
		Upper	1	2	4		50%	1	1		5	14
		Lower	1				50%	1				2
		NA	4	3	1		89%		1			9

subject	crse	Math Skill Level	A	B	C	P	%Passing	D	F	NP	W	Grand Total
BOT	10	Collegiate	7	6	2		79%				4	19
		Upper	1	2			33%	1	1		4	9
		Lower					0%				1	1
		NA	1		1		100%					2
CHEM	32	Collegiate	33	51	47		61%	14	18		52	215
		Upper	10	13	23		38%	16	18		40	120
		Lower			2		14%	2	4		6	14
		NA	14	9	6		59%	4	7		9	49
	40	Collegiate	35	53	48		66%	19	23		27	205
		Upper	7	4	9		43%	5	9		13	47
		NA			1		100%					1
	101A	Collegiate	12	37	58		55%	26	21		42	196
		Upper	1	2			60%		1		1	5
		NA	2	1	3		75%	1	1			8
	103A	Collegiate	2	4	9		58%		4		7	26
ENRG	3	Collegiate	6	3	2		52%	3	1		6	21
		Upper	8	2	1		65%	2			4	17
		Lower					0%		1		2	3
		NA	5	3	3		44%	2	1		11	25
GEN	10	Collegiate	14	6	6		68%	4			8	38
		Upper		4			29%	2			8	14
		Lower					0%				3	3
		NA	1	1			29%	1	1		3	7
GEOG	1	Collegiate	32	36	43		75%	7	9		21	148
		Upper	6	15	21		52%	9	14		16	81
		Lower			3		30%	3	2		2	10
		NA	1	6	5		55%	3	2		5	22
GEOL	10	Collegiate	3	8	10		57%	4	5		7	37
		Upper		1	3		19%	3	9		5	21
		Lower					0%		4		2	6
		NA	4	4	5		50%		8		5	26
M B	10	Collegiate	7	2	6		65%	2	2		4	23
		Upper		1			25%	2	1			4
		Lower					0%	2	1		1	4
		NA	5	2			70%	1			2	10
	12	Collegiate	33	26	30		72%	9	9	1	16	124
		Upper	1	9	4		70%				6	20
		Lower					0%				1	1
		NA	9	8	3		77%	1			5	26
O H	77	Collegiate	6	1			100%					7
		Upper	10	5	4		86%		1		2	22
		NA	10	4	4		86%				3	21
OCAN	1	Collegiate	9	12	5		54%	5	6		11	48
		Upper	2	6	5		37%	1	15		6	35
		Lower					0%		2		2	4
		NA	2	3	4		30%	3	10		8	30
P SC	11	Collegiate	11	14	8		79%	1	3		5	42
		Upper	1	4	10		71%	2	1		3	21
		Lower			2		50%	1			1	4
		NA	1	2	4		54%	1	2		3	13
PHYC	2A	Collegiate	20	25	25		53%	22	24		16	132
		Upper		2	1		25%	1	5		3	12
		NA	2	2	3		39%	4	5		2	18
	4A	Collegiate	30	37	19		51%	10	19		53	168
		NA	1	3	1		63%	1			2	8
	10	Collegiate	97	103	77		83%	14	22		21	334
		Upper	23	24	36		57%	21	24		18	146
		Lower	1	3	7		33%	7	11		4	33
		NA	16	19	9		59%	6	15		10	75
	40	Collegiate	15	7	3		83%	1	1		3	30
		Upper			1		33%		1		1	3
		NA		1			25%		2		1	4
	41	Collegiate	12	10	11		66%	3	6		8	50

subject	crse	Math Skill Level	A	B	C	P	%Passing	D	F	NP	W	Grand Total
		Upper					0%		1		2	3
PHYS	1	Collegiate	5	8			81%				3	16
		Upper	1	1			100%					2
		NA	2	1	1		67%	1	1			6
	12	Collegiate	34	56	27		85%	7	4		9	137
		Upper	5	11	7		70%	5	1		4	33
		NA	6	7	5		78%	2	2		1	23
	67	Collegiate	2	7	4	1	74%	1	2		2	19
		Upper			1		25%	1	2			4
		NA		2	1		50%	1	1	1		6
ZOOL	10	Collegiate	4	9	6		79%	1	1		3	24
		Upper	1	5	1		70%	1	2			10
		Lower			1		100%					1
		NA					0%	1			1	2
Grand Total			**1065**	**1118**	**1062**	**6**	**61%**	**474**	**682**	**2**	**927**	**5336**

subject	crse	English Skill Level	A	B	C	P	%Passing	D	F	NP	W	Grand Total
ANAT	25	Collegiate	59	49	44		66%	20	13		45	230
		Upper	7	10	7		53%	5	7		9	45
		Lower	3	5	10		36%	10	11		11	50
		NA	35	10	9	1	70%	4	6		14	79
ANTH	1	Collegiate	42	22	16	3	73%	9	10		12	114
		Upper	3	2	2	1	42%	2	7		2	19
		Lower	6	1	2		32%	1	13		5	28
		NA	8	5	4		46%	4	11		5	37
ASTR	1	Collegiate	40	30	36		59%	20	19		34	179
		Upper	4	8	11		40%	4	12		18	57
		Lower	1	12	14		27%	15	26		33	101
		NA	13	9	11		42%	6	14		25	78
	4	Collegiate	27	12	14		79%	7	5		2	67
		Upper	2	1	1		50%	0	1		3	8
		Lower	3	5	3		58%	3	2		3	19
		NA	5	4			82%	0	2			11
	14	Collegiate	2	10	11		53%	8	7		5	43
		Upper	2	1	2		26%	2	7		5	19
		Lower			3		12%	6	11		6	26
		NA	2	4	2		36%	2	5		7	22
	17	Collegiate	1	7	5		57%	1	4		5	23
		Upper		2			50%	0	1		1	4
		Lower	1		2		30%	2	4		1	10
		NA	2	1	1		57%	0	2		1	7
	18	Collegiate	3	1	1		83%	1				6
		Upper			1		25%	1			2	4
		Lower		1			25%	0	1		2	4
		NA	1	1	1		50%	0	2		1	6
	19	Collegiate	2	2			67%	0			2	6
		Upper	1		1		67%	0			1	3
		NA	1				33%	0			2	3
BIO	9	Collegiate	97	91	78		80%	22	25		20	333
		Upper	11	18	15		62%	8	12		7	71
		Lower	13	16	26		50%	16	17		23	111
		NA	17	15	9		65%	0	10		12	63
	11	Collegiate	25	22	32		70%	11	9		14	113
		Upper	2	4	7		54%	2	5		4	24
		Lower	2	5	4		38%	2	11		5	29
		NA	5	3	4		67%	3	1		2	18
	20	Collegiate	11	8	10		85%	0	5			34
		Upper		1	1		40%	0	3			5
		Lower					0%	0	2			2
		NA	1				100%	0				1

subject	crse	English Skill Level	A	B	C	P	%Passing	D	F	NP	W	Grand Total
	31	Collegiate	6		5		79%	1			2	14
		Upper	1				25%	0	1		2	4
		Lower					0%	0	4		4	8
		NA	2	1	2		63%	0	3			8
	40	Collegiate	2	1	3		35%	1	1		9	17
		Upper			1		100%	0				1
		Lower			2		40%	2			1	5
		NA	5	5	2		92%	0	1			13
BOT	10	Collegiate	7	7	2		67%	1	1		6	24
		Upper		1			100%	0				1
		Lower					0%	0			1	1
		NA	2		1		60%	0			2	5
CHEM	32	Collegiate	26	43	43		54%	16	19		62	209
		Upper	7	7	9		50%	3	9		11	46
		Lower	3	6	11		34%	8	12		19	59
		NA	21	17	15		63%	9	7		15	84
	40	Collegiate	31	40	39		64%	18	17		27	172
		Upper	4	7	6		65%	2	3		4	26
		Lower	3	7	10		50%	3	10		7	40
		NA	4	3	3		67%	1	2		2	15
	101A	Collegiate	10	27	44		56%	13	17		34	145
		Upper	3	4	6		59%	5			4	22
		Lower	2	6	2		50%	4	3		3	20
		NA		3	9		55%	5	3		2	22
	103A	Collegiate	2	3	8		72%	0	1		4	18
		Upper		1			25%	0	2		1	4
		Lower					0%	0			1	1
		NA			1		33%	0	1		1	3
ENRG	3	Collegiate	12	3	1		62%	4			6	26
		Upper	1				25%	0			3	4
		Lower	1		1		25%	1	1		4	8
		NA	5	5	4		50%	2	2		10	28
GEN	10	Collegiate	12	8	5		57%	6			13	44
		Upper	1	2	1		57%	0			3	7
		Lower					0%	0			2	2
		NA	2	1			33%	1	1		4	9
GEOG	1	Collegiate	35	47	44		72%	10	14		25	175
		Upper	2	3	18		68%	3	4		4	34
		Lower		2	6		25%	6	6		12	32
		NA	2	5	4		55%	3	3		3	20
GEOL	10	Collegiate	4	8	9		50%	7	3		11	42
		Upper			2		22%	0	4		3	9
		Lower			1		8%	0	10		1	12
		NA	3	5	6		52%	0	9		4	27
M B	10	Collegiate	4	3	3		50%	3	2		5	20
		Upper	1	1	1		60%	0	1		1	5
		Lower			1		33%	2				3
		NA	7	1	1		69%	2	1		1	13
	12	Collegiate	28	34	30		74%	5	8	1	18	124
		Upper		2	2		44%	2			3	9
		Lower			1		50%	0			1	2
		NA	15	7	4		72%	3	1		6	36
O H	77	Collegiate	8	1	1		83%	0			2	12
		Upper	1		2		75%	0	1			4
		Lower	7	6	1		100%	0				14
		NA	10	3	4		85%	0			3	20
OCAN	1	Collegiate	6	15	9		52%	5	12		11	58
		Upper	2	3	1		46%	1	4		2	13
		Lower			1		8%	0	8		3	12
		NA	5	3	3		32%	3	9		11	34
P SC	11	Collegiate	10	13	9		80%	1	2		5	40
		Upper	2	2	5		75%	1	1		1	12
		Lower		1	5		50%	3	1		2	12
		NA	1	4	5		63%	0	2		4	16

subject	crse	English Skill Level	A	B	C	P	%Passing	D	F	NP	W	Grand Total
PHYC	2A	Collegiate	11	15	22		53%	17	18		8	91
		Upper	1	2	3		40%	2	4		3	15
		Lower	4	7	1		52%	3	3		5	23
		NA	6	5	3		42%	5	9		5	33
	4A	Collegiate	19	28	16		50%	6	13		45	127
		Upper	4	2	1		50%	2	3		2	14
		Lower	3	7	3		62%	0	1		7	21
		NA	5	3			57%	3	2		1	14
	10	Collegiate	50	65	37		80%	10	8		19	189
		Upper	16	9	20		75%	2	10		3	60
		Lower	27	32	38		61%	21	27		15	160
		NA	44	43	34		68%	15	27		16	179
	40	Collegiate	11	6	3		80%	1	1		3	25
		Upper	1				100%	0				1
		Lower	1	1	1		60%	0	1		1	5
		NA	2	1			50%	0	2		1	6
	41	Collegiate	7	5	7		66%	2	2		6	29
		Upper		1			20%	0	3		1	5
		Lower	2	2	3		88%	0	1			8
		NA	3	2	1		55%	1	1		3	11
PHYS	1	Collegiate	4	6			77%	0			3	13
		Upper		1			100%	0				1
		Lower	1				100%	0				1
		NA	3	3	1		78%	1	1			9
	12	Collegiate	35	50	27		84%	7	4		11	134
		Upper	2	9	4		75%	2	2		1	20
		Lower	1	3	3		78%	2				9
		NA	7	12	5		80%	3	1		2	30
	67	Collegiate	1	7	5	1	88%	1	1			16
		Upper					0%	2	2			4
		Lower					0%	0	2		1	3
		NA	1	2	1		67%	0		1	1	6
ZOOL	10	Collegiate	4	10	4		90%	1	1			20
		Upper		3	1		80%	0			1	5
		Lower			3		33%	2	2		2	9
		NA	1	1			67%	0			1	3
Grand Total			1065	1118	1062	6	61%	474	682	2	927	5336

Appendix D. Workgroup Procedures

For details of workgroup procedures, review notes, goals, policies, and resources developed by the General Education Outcome – Area C Workgroup, visit our website:
http://www.ccsf.edu/NEW/en/about-city-college/slo/reports/sloc/geo_area_c.html